Dominion Energy Kewaunee, Inc.
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APR 25 2007

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No. 07-0324
KPS/LIC/RS: RO
Docket No. 50-305
License No. DPR-43

DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
LICENSEE EVENT REPORT 2007-004-00

Dear Sirs:

Pursuant to 10 CFR 50.73, Dominion Energy Kewaunee, Inc., hereby submits the following Licensee Event Report applicable to Kewaunee Power Station.

Report No. 50-305/2007-004-00

This report has been reviewed by the Plant Operating Review Committee and will be forwarded to the Management Safety Review Committee for its review.

If you have any further questions, please contact Mr. Richard Sattler at (920) 388-8121.

Very truly yours,

M. Quint, acting site VP
Leslie N. Hartz
Site Vice President, Kewaunee Power Station

Attachment

Commitments made by this letter: NONE

IE22

cc: Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
2443 Warrenville Road
Suite 210
Lisle, IL 60532-4352

Ms. Margaret H. Chernoff
Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop 8 G9A
Washington, D. C. 20555

NRC Senior Resident Inspector
Kewaunee Power Station

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0066), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Kewaunee Power Station	05000305	1 of 5

TITLE (4)

Reactor Trip During Quarterly Nuclear Instrumentation Calibration Procedure

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	27	2007	2007	-- 004 --	00	04	25	2007	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR : (Check all that apply) (11)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)	X	50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Richard Sattler	(920) 388-8121

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	JC	94	W120	Y					

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT

On 2/27/2007 at 23:33 CST, with the reactor at approximately 100% power, while performing a quarterly channel calibration on nuclear instrument channel N-43, the reactor tripped. MS-201B1, Reheat Steam to MSR B1, failed to close, (a repeat occurrence), which resulted in a reactor coolant system cooldown to 537 degrees F. Per contingency procedures, action was taken to manually isolate the turbine moisture separator reheat steam, which halted the cooldown, and Tave was restored to 547 degrees F. The additional cooldown resulted in a chemical and volume control system letdown isolation on low pressurizer level. Main feedwater isolated and auxiliary feedwater initiated, as designed, due to low-low level in the steam generators. No other safeguards systems actuated during the transient.

The direct cause of the event appears to have been a Westinghouse BF66 relay contact failure in the reactor protection system trip matrix associated with nuclear instrumentation. The specific relay could not be determined. The most probable root cause has been determined to be blind contact relay failures due to a combination of relay contact sulfidation caused by poor circuit design, manufacturing defects in some installed relays, and installation practices from the original installation 30 years ago being inconsistent with current standards and practices.

This event is being reported under 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in automatic actuation of the reactor protection system and the auxiliary feedwater system.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Kewaunee Power Station	**05000305**	**2007**	**-- 004 --**	**00**	2 of 5

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

Event Description:

On 2/27/2007, with the reactor at approximately 100% power, as an initial condition for nuclear instrument (NI) channel N-43 calibration, surveillance procedure SP-47-316C, Channel 3 (Blue) Instrument Channel Test, was performed. This was done to determine if there were blind contact failures in any of the channel N-41, N-42, or N-44 nuclear instrument channels. All channels performed as expected with no abnormality.

Surveillance procedure SP-48-004I, Nuclear Power Range Channel 3 (Blue) N43 Quarterly Calibration, was briefed with the staff. Annunciators and status lights were checked per the procedure. Power range N-43B drawer was turned off following a peer check from the control room operators. When the N-43B drawer was deenergized, (at 23:33 CST), the plant tripped.

Following the trip, MS-201B1, Reheat Steam to MSR B1, failed to close, (a repeat occurrence), which resulted in a reactor coolant system (RCS) cooldown to 537 degrees F. Per contingency procedures, action was taken to manually isolate the turbine moisture separator reheat steam, which halted the cooldown, and Tave was restored to 547 degrees F. The additional cooldown resulted in chemical and volume control system letdown isolation on low pressurizer level. Main feedwater isolated and auxiliary feedwater initiated, as designed, due to low-low level in the steam generators. No other safeguards systems actuated during the transient.

Event Analysis:

This event is being reported under 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in automatic actuation of the reactor protection system and the auxiliary feedwater system.

Shortly after the trip, two areas were identified as possible causes of the trip; power range drawer N-43 and the B reactor trip breaker. These areas were quarantined to preserve condition of the equipment for investigation.

Before plant restart, the following three areas were investigated and/or repaired:

1. Nuclear Instruments (NIs) and affected relays (including relays in the reactor protective system (RPS)):
   - Checks were performed to verify control power from N-41, N-42, and N-44 NI channels. This check verified that the three remaining channels were holding RPS protective relays in the energized (non-tripped) state.
   - NI Train A & B trip logic relays were checked and no failures were indicated.
   - The Overtemperature Delta Temperature (OTDT) relays were checked for blind failures. These were tripped with bistable switches during the surveillance testing. The relay leads are landed with square washers. Industry OE has identified that these washers could misalign and rub against the phenolic sides, thus appearing as though the screw is torquing down the lead, when in reality, the screw is torquing down against the phenolic sides. The washer checks and wire checks found no problems or issues.

No definite cause could be identified with the NIs or the affected relays, but due to a history of previous Westinghouse BF66 relay blind failures, the decision was made to replace all 24 relays associated with the NIs. An additional 64 relays containing contacts that directly interface with the trip logic were also replaced. These 88 relays encompass most RPS relays directly affecting RPS trip contacts at power.

As relays were replaced, it was determined that the installation practices from the original installation 30 years ago were inconsistent with current standards and practices. Multiple issues were identified, including:

- The sides of some original lugs were too wide to fit and the lugs had been filed down.
- There was a practice of folding back the wire within the lug barrel to help fill the void.
- Some brands of lugs did not have the ability to crimp the insulation.

Each termination not conforming to acceptable requirements was either repaired or evaluated and documented as not affecting operability.

In addition, a previously identified issue of sulfidation and oxidation forming on relay contacts was confirmed.

The replaced relays were sent for laboratory analysis and testing.

2. Reactor trip and bypass breakers:

Following the reactor trip, electrical maintenance performed maintenance on the reactor trip breakers and the cubicles. The reactor trip breaker "B" (RTB) was the first breaker to open at 23:33:14.918. Reactor trip breaker "A" (RTA) opened 0.215 seconds later. RTB either tripped on a valid signal or malfunctioned. The timing of the trip was coincident with deenergizing of the NI channel N-43 for maintenance. Because the cause of the trip was unknown, the reactor trip breaker (RTB) was tested as the possible cause of the trip.

Both reactor trip breakers and both reactor trip bypass breakers were shipped to the vendor to have preventative maintenance performed per the latest vendor manual recommendations. The breakers were found to be in excellent condition. The as-found condition of the breakers demonstrated that the breakers had been maintained at a level acceptable to the requirements published by the vendor. The breakers were returned from the vendor, reinstalled and post maintenance testing was performed. The spare breaker was also shipped to the vendor to be rebuilt and returned at a later date.

3. Moisture Separator Reheat Stop Valve:

The bottom bushing and valve stem for MS-201B1, Reheat Steam to MSR B1, were replaced to eliminate excessive total indicated runout.

Following completion of the above actions, the plant was restarted on 3/9/07.

Subsequent to the plant restart, a root cause evaluation was performed utilizing input from the laboratory and vendor analyses. The principal results of that root cause are described in the Cause and Corrective Actions sections that follow.

Safety Significance:

This event did not create any plant safety issues or personnel injury/safety issues. The control room operating crew responded appropriately to the plant trip addressing all unexpected plant responses to the transient. Although MS-201B1 failed to close when required, compensatory actions were taken and the plant was successfully shut down.

Causes:

For the trip, the most probable root cause has been determined to be the combination of relay contact failures caused by:

- Poor circuit design
- Manufacturing defects in some installed relays
- Substandard installation practices

The apparent cause of MS-201B1 sticking at 100% open was determined to have been excessive wear in the valve lower plug guide at the bushing. The valve guide had 0.143" wear due to the large clearance between the guide to the bushing and old style bushing. This wear created a ledge for the guide to latch onto the bushing while the steam flow pushed the plug/guide into the bushing.

The contributing causes of MS-201B1 sticking at 100% open were determined to be:

1. This valve has the highest steam flow of the four valves (approximately 128,500 pounds per hour) due to the supply piping arrangements. This contributes to higher side loading of this valve, which contributes to the excessive wear.
2. The bottom bonnet and the top bonnet sleeves had a maximum clearance of 0.017", (as opposed to the 0.005" allowed by engineering), which gave the room needed for the plug/guide to have a hammer effect on the guides and bushings when open.

Corrective Actions:

Corrective actions for the restart included:

1. Eighty-eight (88) RPS trip matrix relays were replaced.
2. Both reactor trip breakers and both bypass breakers were inspected and had preventative maintenance performed by the vendor.
3. MS-201B1 was rebuilt using all the clearances and maintenance practices previously identified but not yet implemented.

4. The bottom bushing and valve stem in MS-201B1 were replaced to eliminate the excessive wear problem.

Corrective actions for the reactor trip include:

1. Potential design changes will be investigated and implemented as appropriate.
2. Procedure changes (including revised inspection, testing, and acceptance criteria) will be determined and implemented as appropriate.
3. Terminations not meeting current requirements will be reconfigured as necessary.

Corrective actions for the MS-201B1 failure-to-close are:

1. All of the needed clearances and maintenance practices will be captured in a procedure for future work on the MS-201 valves.
2. An evaluation will be performed to determine if one MS-201 valve can be closed while at 100% power. The purpose of this evaluation is to determine if a Post Maintenance Test of actual conditions can be performed on the MS-201B1 valve, to ensure that this valve will close with a turbine trip/shut down.

Similar Events:

- LER 1985-012, Inadvertent Reactor Trip During Intermediate Range Detector Calibration
- LER 1986-008, Reactor Trip During Surveillance Testing Due To Personnel Error
- LER 1996-003, Spurious Reactor Trip During Surveillance Testing
- LER 1995-005, Spurious Reactor Trip During Surveillance Testing
- LER 2006-013, Reactor Trip From Nuclear Instrumentation Low Range – High Flux Trip Caused By Blind Relay Contact Failure.